

Permutations.

1. Use the braid technique to write out the permutation $(126)(453)$ as a product of transpositions. Check that your answer is correct. Determine the sign of $(126)(453)$.
2. Use the braid technique to write out the permutation (162534) as a product of transpositions. Check that your answer is correct. Determine the sign of (162534) .
3. List all the elements of $S_4 = \text{Perm}(\{1, 2, 3, 4\})$. Group the elements according to cycle structure. Determine which elements are even and which are odd.
4. List all different cycle structures of the elements of $S_5 = \text{Perm}(\{1, 2, 3, 4, 5\})$, and determine how many elements there are of each cycle type (you do not have to explicitly list all the elements in order to do this). Determine which elements are even and which are odd.
5. Prove that an m -cycle is even if m is odd, and it is odd if m is even.
6. Write out the following conjugates fgf^{-1} where
 - $f = (1234)$ and $g = (231)$.
 - $f = (12)$ and $g = (134)$.
 - $f = (142)(35)$ and $g = (123)(45)$.
7. Prove that the conjugate of an even permutation is even, and that the conjugate of an odd permutation is odd.